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VIRGIN ISLANDS AGRICULTURAL EXPERIMENT STATION
ST. CROIX, VIRGIN ISLANDS, U. S. A.

Under the supervision of the
UNITED STATES DEPARTMENT OF AGRICULTURE

REPORT OF THE VIRGIN ISLANDS AGRICULTURAL EXPERIMENT STATION

1931

Issued May, 1932

UNITED STATES DEPARTMENT OF AGRICULTURE
OFFICE OF EXPERIMENT STATIONS

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VIRGIN ISLANDS AGRICULTURAL EXPERIMENT STATION, ST. CROIX

[Under the supervision of the Office of Experiment Stations, United States Department of Agriculture]

JAMES T. JARDINE, *Chief, Office of Experiment Stations.*

WALTER H. EVANS, *Chief, Division of Insular Stations, Office of Experiment Stations.*

STATION STAFF

J. R. RICKS, *Director.*

W. M. PERRY, *Horticulturist.*[1]

G. A. ROBERTS, *Animal Husbandman and Veterinarian.*

N. N. NICHOLS, *Associate Animal Husbandman and Dairyman.*[2]

MISS HELEN L. CAWLEY, *Specialist in Home Economics.*[3]

CLAUD L. HORN, *Horticulturist.*

A. BISSERUP, *Executive Assistant.*

GLEN BRIGGS, *Agronomist.*[4]

---

[1] Detailed as agriculturist on the islands of St. Thomas and St. John.
[2] Appointment effective June 8, 1931.
[3] Appointment effective Apr. 1, 1931.
[4] Appointment effective Aug. 24, 1931.

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REPORT OF THE VIRGIN ISLANDS AGRICULTURAL EXPERIMENT STATION, 1931

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REPORT OF THE DIRECTOR

By J. R. Ricks

Because of a drought that prevailed during the greater part of the fiscal year ended June 30, 1931, and a resultant almost total crop failure, only little progress was made in the work of the station.

With the discontinuance of operations of the principal sugar-manufacturing company of St. Croix in May, 1930, cane-growing activities generally were abandoned, and the production of sugar for the fiscal year 1931 can not therefore be accurately estimated. January was not so wet as in the previous year, and the possibility of a severe drought gave rise to anxiety among plantation owners. Heavy rains fell from about May 15 to late June, however, and greatly revived vegetation and increased the chances for a plentiful sugar crop in 1932.

W. W. Skinner, assistant chief of the chemical and technological research unit of the Bureau of Chemistry and Soils, United States Department of Agriculture, spent about two weeks in March, 1931, in the Virgin Islands, for the purpose of studying the possibilities of the bay-oil industry and the growing of insecticidal plants.

In early May, C. B. Doyle, J. S. Townsend, and R. L. Taylor, of the Bureau of Plant Industry, United States Department of Agriculture, made a survey of St. Croix as a possible cotton-growing

country under existing conditions. Sea-island cotton was for many years grown successfully and marketed at fancy prices during and immediately following the World War. Some of the crop in 1920 brought on the market $2 per pound. This stimulated production for a while. In 1921, however, the pink bollworm appeared. Soon economic conditions brought about a reduction in price for the staple, and the industry received a setback from which it has never recovered. In fact, no cotton has been grown commercially in St. Croix since 1927.

Mr. Doyle has suggested the use of a shorter fiber strain of sea-island cotton with staple 1½ to 1⅝ inches in length. Such a cotton is adapted to roller ginning, and could be marketed in the States free of duty and for this reason would have a distinct advantage over imported cottons of similar length. The experiment station has given considerable attention to cotton and has produced a number of crosses, many of which are very promising. Because of the pink-bollworm eradication program, no cotton was planted commercially in the island in 1931. Seed from the plants of the more promising crosses was sown at the station, and the resultant plants will be further tested in plats as soon as the pink-bollworm situation improves.

James Thorp, of the Bureau of Chemistry and Soils, United States Department of Agriculture, was in St. Croix for two weeks in May, 1931, making a soil survey. He also gave attention to the possibility of developing irrigation in certain parts of the island in the event that sufficient water supplies should be developed. If irrigation is practiced, care should be taken not to induce excessive concentration of alkali and other soluble salts that are injurious to plants. Sodium carbonate, commonly known as black alkali, was found in spots on fairly large areas near Great Pond, the leper asylum, and the Southgate, Bethlehem, Castle Burke, and Jerusalem estates. Such salts as sodium chloride and sodium sulphate, and in lesser quantities other soluble salts commonly known as white alkali are rather widely distributed, especially sodium chloride, along the marginal lands of the low coastal plains and alluvial fans. The salts are most concentrated near the numerous lagoons. A few streaks of white alkali of low concentration were found inland between the Enfield Green and the Morning Star estates.

Soils affected by black alkali become puddled and impervious to water and can be made productive, usually, only when given expensive chemical treatment combined with copious irrigation and carefully planned drainage. In the regions in which white alkali is found in small amounts, 0.2 to 0.4 per cent, most crops may make decreased yields, seed germination may be affected, and many young plants may die. Moderately affected areas, 0.4 to 1 per cent, are likely to contain large barren spots. Only highly salt-tolerant plants, such as certain grasses, coconuts, and dates, will grow on such soils. The strongly affected areas, 1 to 3 per cent or more, are ordinarily devoid of all economic crops.

During the year two wells were completed. These assure a good supply of water. Two acres near the plant house were planted with vegetables, and a small portable Skinner system was installed to test the effect of irrigation water on the immediate crop and on future plantings in the same soil. The plan is to irrigate plats of sugar-

cane, corn, and other field crops. Although wells 100 to 200 feet deep are of doubtful value in furnishing a sufficient supply of water for irrigation on a large scale, it is thought that irrigation on a small scale can be profitably practiced if the water is not found to injure the plants.

U. C. Loftin, of the Bureau of Entomology, United States Department of Agriculture, came to the Virgin Islands in May, 1931, to study the pink-bollworm situation and to determine whether eradication of that insect was feasible. Owing to the widespread distribution and abundance of wild cotton, it was decided that eradication was not feasible but that considerable control of the pink bollworm could be obtained by the destruction of the wild-cotton plants.

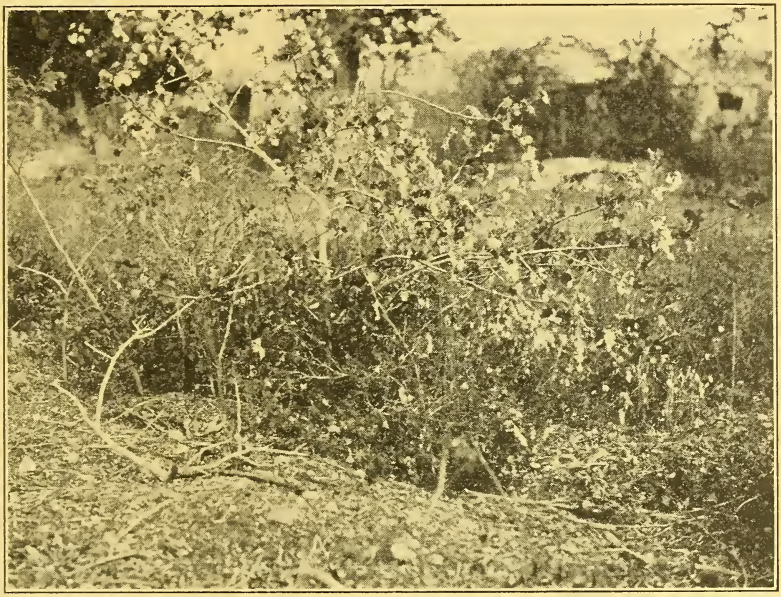

FIGURE 1.—Wild cotton

Upon the return of Mr. Loftin to the United States, J. P. Nielsen, a practical farmer, was employed to supervise the work of destroying wild-cotton plants. (Fig. 1.) Because of the dense growth of brush, definite results may not be secured for several years.

In 1929 and 1930, E. W. Sheets, Chief of the Animal Husbandry Division of the Bureau of Animal Industry, United States Department of Agriculture, at the request of Herbert D. Brown, Chief of the United States Bureau of Efficiency, spent some time in the Virgin Islands with the latter, studying livestock and agricultural problems.

In his report, Mr. Sheets suggests that the program of the station be expanded to include some extension work and the addition of several specialists to the staff. These included a specialist in home economics, a dairyman, an assistant in animal husbandry, a man to do poultry work, and additional office assistants. It was recommended that repairs and improvements be made at the station and

that additional equipment be provided. This report was submitted to Congress, and sufficient funds were appropriated to carry out the recommendations, which had the approval of Walter H. Evans, Acting Chief of the Office of Experiment Stations, and A. F. Woods, Director of Scientific Work, both of the United States Department of Agriculture. The additions to the staff have been made, repairs to old buildings for the most part have been finished, several new buildings have been constructed, and a new program of research and extension work is now under way.

Realizing the possibilities of improving the quality of livestock in the islands, the Animal Husbandry Division of the Bureau of Animal Industry has been very helpful in supplying breeding animals and fowls for use in experimental work at the station and for improving both livestock and poultry work. The animals and fowls were lent to the station and are being used on all three islands.

In the animal husbandry division of the station the work included general management of the station herd, keeping milk and butterfat production records of 10 cows, and miscellaneous veterinary practices in the interest of the stockmen of the islands. The animal husbandman and veterinarian, in addition to his regular duties, attended 17 meetings of the St. Croix Livestock Association, made 733 visits in the performance of his duty as a veterinarian, and traveled 9,306 miles, exclusive of a trip to St. John and St. Thomas and one trip to Porto Rico, to further the interest of the local animal industry.

For four and one-half months of the fiscal year, beginning August 15 and covering the rainy season, the horticulturist was called upon to act as supervisor of an extensive garden program undertaken by the island government as an emergency measure to provide food for the many laborers and their families who were thrown out of employment when the sugar centrals closed. This work necessitated the temporary suspension of experiments begun to determine the possibility of producing vegetables locally for marketing in New York during the winter.

In the newly established home economics division attention was given (1) to improving the standard of living of the natives; (2) to teaching groups of women how to provide adequate dietaries for their families; (3) to interesting school children in a school-lunch program and in 4-H club work; (4) to forming groups of women into organizations for the solution of problems of importance to them; and (5) to furthering the interests of civic work.

The agriculturist for St. Thomas and St. John continued his efforts to promote agricultural development on these islands. With the exception of cattle raising, the experimental activities carried on in these islands are altogether different from those in St. Croix. In St. Thomas and St. John the land is for the most part rugged and hilly, making cultivation rather difficult and necessitating the practice of intensive agriculture. Truck crops and fruits, such as the banana and the pineapple, are grown for the local market. The work of the year was concerned primarily with the determination of varieties of fruits and vegetables that are best adapted to local conditions and to the improvement of those already growing on the islands. Some attention was given to the marketing of crops and crop products. As much time as could be spared from other duties was given to developing the local livestock and poultry industries.

CHANGES IN PERSONNEL

J. B. Thompson, director of the station for about eight years, was transferred in February to a position with the field station of the United States Department of Agriculture in Jeanerette, La. He was succeeded by J. R. Ricks, formerly director of the Mississippi Agricultural Experiment Station.

M. S. Baker, agronomist of the station, resigned in November, 1930, to accept a position with the Central Aguirre in Porto Rico. His place remains unfilled. Little agronomy work was done therefore during the year.

The services of C. L. Horn, horticulturist of the station, were lent to the municipality of St. Croix for the first half of the fiscal year for the purpose of supervising vegetable growing by individual families. He returned to the station in January.

Home economics research was made a regular division of the station during the year with Helen L. Cawley in charge.

N. N. Nichols was added to the staff as associate animal husbandman and dairyman.

STATION IMPROVEMENTS

The writer on his arrival at the station in March, 1931, found the whole plant in a decidedly dilapidated condition. All the station buildings (figs. 2 and 3) needed repairing, and field and pasture lands required attention. The station buildings were repaired as far as possible with the appropriations allotted for the work, and some minor repairs were made to the tenant-village houses. A double-fenced tick-free pasture and a suitable shed were provided for the station-herd sires. Fifty acres of old fenced land was cleared of heavy brush, and the small areas now in use as pasture were cleared of weeds and a light growth of brush. The guinea grass planted last year for pasture improvement began to make good growth. A dairy barn with a capacity for 20 cows was partly completed. It is the first dairy barn on the island. Because of insufficient funds for building, horse barns and implement sheds of a temporary nature only can be built at present.

One of the new wells, 165 feet deep and holding 115 feet of water, was completed to increase the water supply. Piping was laid from the reservoirs on the hill near the director's home to the other two residences, the office building, the plant house, the barns, and the pastures. The present water-supply system is a decided improvement over the old method of hand pumping. Leaking cisterns and reservoirs were repaired as rapidly as possible.

The propagation house was repaired, and the building of a potting shed was begun. The United States Forest Service constructed an addition to the propagation house for its use in forestry work in the islands.

A recently built temporary potato-curing house was used for the storage of 112 bushels of sweetpotatoes to determine whether such houses are beneficial to the keeping qualities of sweetpotatoes in the islands.

The work oxen of the station were largely replaced with tractors and with mules.

GRASSES

A number of grasses and other pasture plants are being tested in plats with gratifying results. Some of the more promising kinds have been given field tests under pasture conditions.

On some plantations land has been allowed to go out of cultivation, with the expectation that pasture plants would cover it.

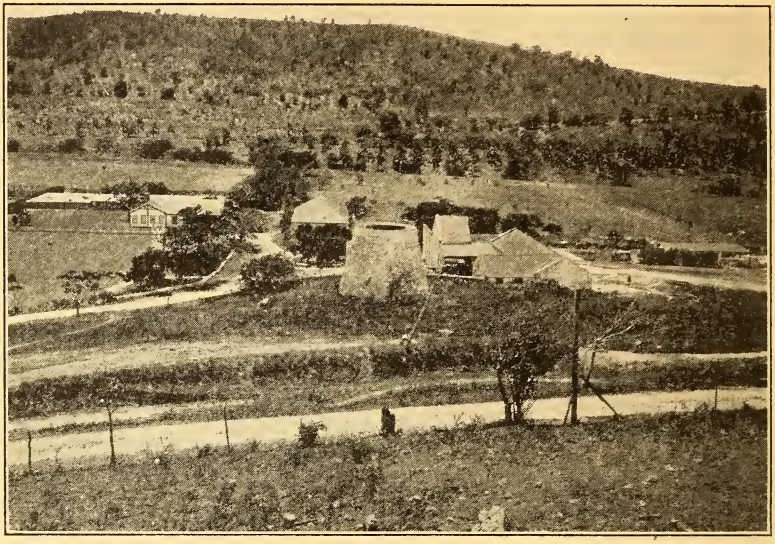

FIGURE 2.—General view of the agricultural experiment station, St. Croix

FIGURE 3.—Office building, St. Croix Agricultural Experiment Station

Instead of guinea grass and other valuable pasture plants becoming established, Barbados sour grass (*Andropogon pertusus panormitanus*) and hurricane grass, which is considered to be a racial form of Barbados sour grass, are spreading rapidly, especially in the southwestern part of St. Croix. Hurricane grass is especially aggressive,

and acting on the suggestion of H. N. Vinal of the Bureau of Plant Industry, United States Department of Agriculture, a cooperative experiment for the control of hurricane grass was begun in 1930 on the Whim estate, where several acres were badly infested with the grass. (Fig. 4.) The land was thoroughly plowed, and hurricane grass was left growing in strips between plantings of Barbados sour grass, molasses grass (*Melinis minutiflora*), guinea grass, cowpeas, and other valuable forage plants. It was hoped that some of the plants might prove to be aggressive enough to smother out the hurricane grass and recover sufficiently after pasturing to prevent the encroachment of the less valuable species.

The experiment thus far has indicated that thorough cultivation will control hurricane grass, but the only grasses that have shown much promise of competing with it under pasture conditions are

FIGURE 4.—Whim estate. Left, hurricane grass; right, cultivated grass

Barbados sour grass and molasses grass. Both of these grasses are eaten more readily by cattle and when heavily pastured are not able to withstand the encroachment of hurricane grasses from infested areas.

Although closely related botanically, there is a marked difference in the degree to which Barbados sour grass and hurricane grass are grazed. There is little difference in the composition of the two grasses, as is shown in the following report (Table 1) of analyses made by the Bureau of Chemistry and Soils, United States Department of Agriculture.

TABLE 1.—*Composition of Barbados sour and hurricane grasses*

Kind	Water	Ash	Fat	Fiber	Nitrogen	Protein
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Barbados sour grass	5.50	20.00	1.52	28.65	0.45	2.81
Hurricane grass	5.73	20.67	1.10	25.90	.45	2.81

REPORT OF THE ANIMAL HUSBANDMAN AND VETERINARIAN

By G. A. Roberts

CATTLE

The drought of the greater part of the year severely affected pasturage, and there was not sufficient grazing for the cattle at the station until June. Fairly good rains fell in November and in December, but grass grows more slowly during these months than during any other time of the year. Fortunately there was ample rainfall in the western part of the island of St. Croix, and cut grass was purchased there from September to December and sugarcane from March to May, inclusive. During April and May a limited quantity of molasses was given to the cows in milk and to the work animals. The Guernsey herd sire became thin and weak as a result of the shortage of pasturage and had to be placed on a guinea-grass pasture 6 miles distant. He recuperated in a few weeks. Because of a shortage of water at the station, from July 1 to November 15, 1930, all water for the cattle had to be hauled.

Tests were continued to increase the milk production of the station native dairy herd. All cows of proper age were bred either to the Shorthorn or to the Guernsey sire. Table 2 gives the milk production of 10 cows for the year ended June 30, 1931.

Table 2.—*Comparison of milk and butterfat yields of 10 cows for the year ended June 30, 1931*

Cow	Lactations	Length of time in milk	Total yield of milk	Total yield of butterfat
		Days	*Pounds*	*Pounds*
Alma (native)	Third and fourth	289	2,881	144.0
Berry (grade Holstein)	Fifth	365	3,317	138.3
Blossom (native)	do	337	2,993	142.2
Bonnie (Shorthorn × native)	First	243	3,274	171.9
Ellen (Guernsey)	Fourth and fifth	203	1,907	75.0
Lassie (Shorthorn × native)	First	365	2,789	152.4
Mary (native)	Fifth	365	2,968	143.8
Min (Shorthorn × native)	Second	243	2,860	120.1
Spot (Shorthorn × native)	First	365	2,280	106.7
Tiny (Guernsey × native)	do	91	1,717	66.2

The cows subsisted almost wholly on guinea grass and other pasturage, receiving only a limited amount of sugarcane and molasses during April and May. The calves were removed from their mothers within 48 hours after birth and fed by hand; thus, all the milk produced was obtained and weighed.

NOTES ON THE STATION HERD

During the year the station herd of cattle was increased by seven births. At the beginning of the fiscal year 1931 the station had on hand 1 Guernsey herd bull, 1 Guernsey young bull, 12 cows, 5 heifers of breeding age, 6 heifers over 1 year old, 5 heifer calves, 6 work oxen, and 5 mules.

The feces of 6 to 10 calves were examined monthly to determine the seasonal prevalence in the animals of stomach and intestinal worms

and worm eggs. Calves found to be affected were treated with a solution of 1 per cent copper sulphate and three-fourths of 1 per cent nicotine sulphate. The treatment appeared to be effective. The animals seemed to be most seriously affected with these internal parasites in January and in February. Calves as young as 2 months were found to be infested with the worms.

Numerous photographs were taken to permit ready identification of the station animals, to compare the growth of nursing calves with that of calves fed whole milk by hand, and to compare the growth of calves of small weight at birth with that of calves of heavier weight at birth.

One horse, 3 mules, and 16 cattle were treated for various complaints; 1 young bull was castrated; post-mortem examination was made of 2 bulls; and 1 old mule was shot.

The cattle tick was again present in great numbers, and the station cattle and other island cattle had to be dipped at frequent intervals. During the year 19 tests were made at the station to determine the requisite strengths of the arsenical solution used in the dipping vat, and the station animals were dipped once or more frequently on 42 occasions.

INTRODUCTIONS OF LIVESTOCK

An effort is being made to improve the island livestock through the use of purebred animals from the States. Before the introduction of cattle can be made generally successful in the Virgin Islands, however, the cattle tick must be eradicated, suitable grains and legumes for feeding must be provided for the animals, and they must be afforded ample protection from the hot sun the year round.

Through the cooperation of the Bureau of Animal Industry, the station received on August 2, 1931, 1 Morgan stallion, 1 Shorthorn bull of the beef type, 1 Aberdeen Angus bull, 1 Red Polled bull, 2 Corriedale rams, 1 Poland China boar, and 1 Duroc-Jersey boar. On December 18 there were received from the same source a Zebu or Brahman bull, 4 Saanan goats (2 bucks and 2 does), and 1 Toggenburg goat (buck), and in December, 1930, there were sent to St. Thomas 1 Holstein-Friesian bull, 1 Duroc-Jersey boar, 12 White Leghorn hens, and 2 White Leghorn cockerels. Except the Shorthorn bull, which was sent for the exclusive use of the station herd, all the introduced animals have been placed with private owners for varying lengths of time.

The offspring sired by the introduced animals during the year numbered 150 for the two rams, 106 for the two boars, and 74 for the goats.

MISCELLANEOUS ACTIVITIES

The animal husbandman and veterinarian took an active part in the organization of the St. Croix Livestock Association, and spent considerable time among interested persons explaining the advantages to be derived from contact with it. He attended 17 meetings in the interest of the livestock industry, and together with the local commissioner of industries accompanied a committee of the association to Porto Rico with a view to finding a market for St. Croix cattle. The animal husbandman and veterinarian issued certificates

for 1,368 animals showing that the requirements of the quarantine regulations had been complied with. Most of the animals were intended for shipment to the Porto Rican market. In addition, he inspected 9,056 cattle, sheep, and goat hides, having a value of approximately $777. On 25 occasions 1,485 cattle belonging to private owners were brought to the station to be dipped; and 72 tests were made of arsenical baths for cattle in the neighboring vats; on 84 occasions the dipping of 3,016 cattle was supervised preparatory to shipment of the animals to the Porto Rican market. Seven dipping vats are in operation in St. Croix.

Numerous horses, mules, and donkeys were treated for intestinal worms.

The mallein test was applied to a horse having a nasal discharge and nasal scars, but gave negative results.

Horses, mules, and donkeys were found to be suffering from a form of colic. The symptoms were not similar in all instances. Whereas many of the animals suffered from abdominal pains and some showed bloating, most of them suffered from constipation. In a number of instances gastric flatulency was so severe as to necessitate using the stomach pump; in others the trocar was used to release gas from the colon. Some of the affected animals were said to have been on pasture exclusively, but most, if not all, of them had received cut mixed grasses. Examination of the grasses gave no information of value. Usually treatment consisted of enemas and purgatives, although anodynes and agents to lessen fermentation were also tried. Between 10 and 15 per cent of the affected animals died, most of them showing gastric disturbance. Animals recovered when treated early in the attack. Most of the trouble began with the rainy season. A somewhat similar occurrence in Porto Rico was diagnosed by the veterinarians of the United States Department of Agriculture as botulism. However, the nervous symptoms accompanying botulism were not observed locally. Recovery in many instances was rapid after measures were taken to correct constipation.

Fifty-eight head of cattle were treated, mostly for trouble of an obstetrical nature, including difficult parturition, retained placenta, and prolapsus of the vagina.

An undetermined trouble, causing loss of flesh and emaciation, was again prevalent in the cattle on the west and north sides of the island. It is thought they suffered from a mineral deficiency in the rations fed. The cows became so weak as to be unable to rise and died within a week. These cases were found in the dry season. Bone meal was ordered from Porto Rico for the affected animals but did not arrive until the end of the dry season, when the trouble disappeared.

Of the animals introduced into St. Croix during 1930, 275 were cattle, valued at $3,807; 335 were sheep and goats, valued at $986; and 118 were hogs, valued at $616.

REPORT OF THE HORTICULTURIST

By Claud L. Horn

The horticulturist devoted much of his time during the year to emergency work in connection with a campaign to induce the people to cultivate gardens to supply some of their food. As a result, the experimental work of the station was greatly curtailed.

CITRUS

To determine the kind of rootstock for orange and grapefruit that is best suited to the two general soil types in St. Croix, a collection of citrus and allied species was assembled from several sources. Seedlings growing well in the lath-covered house include the rough lemon, the Ponderosa and the Meyer varieties of lemon, the sour orange, giant and willow-leaved sour orange, the bittersweet orange, the sweet orange, an unknown variety of grapefruit, the Duncan variety of grapefruit, the Natsumikan variety of pomelo, the Sampson and Thornton varieties of tangelo, the Cleopatra variety of mandarin, the calamondin, an unknown variety of lime, the Rangpur variety of lime, the sweet lime, *Triphasia trifolia*, and *Severinia buxifolia*.

PINEAPPLES

In an experiment begun to determine the value of an iron sulphate solution for preventing chlorosis in pineapple plants on calcareous soil, two series of pineapple plats were arranged to receive regular sprayings with a 2 to 16 per cent solution. Prolonged drought for four months after planting delayed growth of the suckers, but at this time (June 30, 1931) they appear to have become well established. One series of plats was sprayed at 3-week intervals, and the other at 6-week intervals. The experiment did not progress far enough during the year to yield definite conclusions.

AVOCADOS

Of 17 varieties of avocado that were set in the field in early December, Mexicola, Dutton, Ishim, Puebla, Queen, and Blackbird survived the period of low rainfall. These varieties appear to have become established.

COCONUTS

One thousand coconuts of the San Blas variety were introduced from Nevis, British West Indies, for use in extending the area in coconuts at the station. The grove was started in 1916.

STORING SWEETPOTATOES

The station, realizing that the sweetpotato is the principal food grown by the natives, undertook a storage experiment with the crop in the hope of being able to extend its period of availability. A small 1-room masonry structure having a ventilator in the ceiling was used for the purpose. One hundred and twelve bushels of roots of three varieties were placed in the storage room, which was heated with a stove; and 20 bushels, used as a check, were placed at room temperature in another building. Because of the crude method of heating used, no attempt was made to keep the temperature constant in the storage room. The stove was fired about every four hours to maintain an average temperature of 96° F., in the center of the room. At the end of a curing period of two weeks, firing was discontinued, and the day room temperature fell to around 75°. The tubers began to sprout within a week, and the temperature was therefore again raised to around 96°. By June 30, 1931, all the sweetpotatoes in the check lot had sprouted and were in an advanced stage of decay, whereas those subjected to heat were sound and showed few sprouts.

REPORT OF THE SPECIALIST IN HOME ECONOMICS

By Helen L. Cawley

The specialist in home economics arrived at the station on March 19, 1931. The outstanding activities of the home economics division for the period March 19, 1931, to June 30, 1931, included (1) a study of family life among the natives for the purpose of improving their standard of living and of promoting the wholesome development of their children; (2) a study of foods and nutrition to improve the native dietary by supplementing it with protective foods supplying substantial nourishment, and to encourage the use of more satisfactory methods of preparing food than are now employed locally; (3) the development of the school lunch room for the purpose of promoting habits of correct feeding among the school children; (4) showing young girls how to prepare proper combinations of food; (5) encouraging children and teachers to improve the school kitchens; (6) teaching the children sanitary methods of washing dishes and how to take care of food supplies and the kitchen; (7) grouping women into clubs that will serve as dynamic social centers where the members can develop themselves mentally, socially, and ethically.

The Cooperative Woman's Club was formed during the year and had 50 members. It is divided into various groups each of which has special problems to solve. The club holds a general meeting monthly, when demonstrations in home economics are given by the various groups. The women of the villages meet for club purposes at Grove estate, Hope estate, and Blessing estate. Children were organized into 4-H clubs in the four rural schools of the island. The club members at Diamond, Peter's Rest, and the Friedensfeld School gave their first public program at the closing exercises of the schools.

The specialist in home economics devoted as much time as possible to furthering interest in the programs of the Home and School Association at the Grove estate, Diamond, Peter's Rest, and Frederiksted. She also directed the preparation, cooking, and serving of two meals for a group of 55 persons who took part in one community entertainment.

REPORT OF THE AGRICULTURIST FOR ST. THOMAS AND ST. JOHN

By W. M. Perry

CATTLE

In December a purebred Holstein-Friesian bull and a Duroc-Jersey boar were received from the Bureau of Animal Industry for community use. The Duroc-Jersey boar from St. Croix was placed in St. John. The small-estate owners and tenants, heretofore unable to get the services of good sires, are appreciative of this cooperation on the part of the department. The bull, although young, has been bred to 14 cows since his arrival, and the boar has been bred to 15 sows.

It is a problem how to feed cattle during the protracted droughts that often occur in St. Thomas and St. John. If feeds were available during the dry periods the farmers could keep a larger number

of cattle than they now do. To determine the feeding value of silage for cattle, the concrete silo, 14 by 30 feet, on the Tu Tu estate was filled with guinea grass (*Panicum maximum*) (fig. 5), but as a prolonged drought did not materialize the silage was not used during the year. If the silage proves to be palatable to the animals it will provide a means of increasing the number of cattle kept.

POULTRY

The principal objective with poultry during the year was the determination of the practicability of using self-feeders. Two feeders, one for mash and the other for a grain mixture, were made from discarded gasoline tins and refilled when necessary. Careful records were kept of the amount of feed consumed and the number of eggs

FIGURE 5.—Filling silo with guinea grass

produced. Ordinary kinds of commercial feeds were used. Home-mixed feeds could have been fed to better advantage, but all the necessary ingredients were not available on the local market. The flock consisted of 12 White Leghorn hens that came from the States through the Bureau of Animal Industry, 6 of the highest producing hens from a flock that was trap nested last year, and 2 cockerels. Record keeping was begun January 1, but thieves broke into the roosting shed during the night of April 3 and stole 9 of the hens, thus causing the experiment to be brought to a close. During the first quarter the flock consumed 161 pounds of grain and 32 pounds of mash at a total cost on the local market of $6.75. The hens laid 487 eggs, which brought on the market $24.25, or a profit over cost of feed of $17.50. The eggs were sold for hatching at a premium. At the then-prevailing market price of 4 cents each the eggs would have returned a satisfactory profit.

PRESERVATION OF NATIVE FRUITS

The work of canning the native soursop (*Annona muricata*) was continued, and the product was marketed to a limited extent. Samples sent to northern markets met with a ready response, and several cases of the canned fruit have been ordered. (Fig. 6.) Canned soursop could be largely marketed among the West Indian settlements in New York, and probably elsewhere after the purchasing public learns that the product can be made into jellies and ice cream, or used to make a refreshing beverage.

FIGURE 6.—Canned soursop

Other highly prized products shortly to be put on the northern market are a mango relish, a papaya conserve, and a jelly made by combining the native tree gooseberry with the papaya.

MISCELLANEOUS ACTIVITIES

The agriculturist again served as a member of the beautification committee in St. John, and continued to advise on matters pertaining to the planting and care of trees. He also served as a member of the board of control, agricultural fund, and assisted in planning various school gardens. He visited farmers' clubs, and directed young people's garden-club work. During the year he supervised the dipping of 2,530 head of cattle, inspected 244 introduced head in accordance with provisions of the quarantine laws, received 546 persons who called at the extension office for information on matters pertaining to the farm and to the home, and traveled 3,843 miles in making farm calls.

MUNICIPAL NURSERY

The municipal nursery was established with funds provided by the local government. The purpose is to carry on work of an experimental nature under the direction of the agriculturist, and to grow hardwood trees, ornamentals, fruit trees, and vegetables for distribution. During the year 8,397 plants of various kinds were distributed. Since gardening occupies an important place in the lives of the people of the island, different varieties of vegetables are being tried, and

those proving to be best adapted to local conditions are rapidly replacing the inferior native sorts. Fruit trees of tested varieties are being planted to furnish propagating material to those desiring to grow them. Limes, lemons, mangoes, oranges, grapefruit, papayas, figs, and grapes are under test. Twelve vinifera varieties of grapes are making good growth, and Muscat of Alexandria (fig. 7) and Hunisa have borne some fruit.

VINEYARDS

The demonstration vineyards in St. Thomas and St. John are now coming into bearing although the vines are less than 3 years old. The yield for the year can not be determined at this time because harvesting is not completed. Sufficient information has been gathered, however, to justify the extension of the area in grapes the coming season. The vineyards are pruned in accordance with scientific practice. So far no disease or insect pest, except ants, has attacked the fruit or the vines.

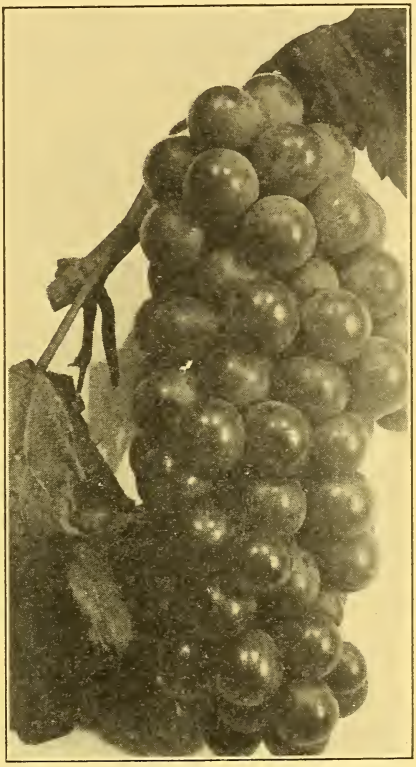

FIGURE 7.—Muscat of Alexandria grapes grown in St. John

REPORT ON COTTON-GROWING POSSIBILITIES IN ST. CROIX

By C. B. DOYLE[1]

Notwithstanding the fact that the island of St. Croix was suffering from a prolonged drought at the time of our visit in April, 1931, both soil and climatic conditions over a considerable area appeared to be favorable for sea-island cotton. The practical possibilities of production under present conditions, however, would seem to depend upon (1) adequate measures for the control of the pink bollworm and other pests: (2) abundance of cheap labor for cultivating, harvesting, and handling the crop: (3) suitable arrangements for production and maintenance of a continuous supply of pure seed; (4) careful supervision, by experienced men, of the preparation, ginning, and baling of the fiber; and (5) a market that would give the growers a reasonable expectation of satisfactory returns for the cotton to justify the much greater costs of production.

The sea-island cotton now grown in Porto Rico and in the islands of the British West Indies is practically confined to the extra-long, fancy strains like that formerly produced on the islands near Charles-

[1] Division of Cotton, Rubber, and Other Tropical Plants, Bureau of Plant Industry, U. S. Department of Agriculture.

ton, S. C. The market for this cotton has always been limited, and, upon the occasion of our visit to the British islands, we were told that a large part of the crop of the previous year was still in storage and that the outlook for disposing of the crop of the present year was not promising. The entire sea-island crop of Porto Rico has in the past few years been contracted for in advance under a guaranteed price from a prominent thread manufacturer. This has given Porto Rican planters a distinct advantage over other producers of this cotton. Recent reports, however, indicate a change in arrangement that may result in difficulty in marketing the crop.

Since in Porto Rico, as in the British islands, plantings of sea-island cotton could readily be expanded if the demand should increase, additional plantings in the Virgin Islands under present conditions would appear to be inadvisable. Possibly consideration could be given to a shorter strain of sea-island cotton, or to some other variety with staple 1½ to 1⅝ inches in length, adapted to roller ginning. Such a cotton could be marketed in the States free of duty and would have an advantage over imported Egyptian of similar length. We understand that only a few manufacturers in the United States are equipped to use the extra-long fiber of the fancy strains now grown in the West Indies, the present interest in this country being largely in the shorter strains like the bulk of the sea-island crop formerly grown in the mainland districts of Georgia and Florida.

Conditions may be favorable for commercial planting of Egyptian cotton in St. Croix, but, on the basis of our experience with many experimental plantings of Egyptian cotton in Texas and other States, the advisability of large-scale plantings in the Virgin Islands would remain doubtful until the adaptability of this cotton had been demonstrated over a period of years.

SOIL SURVEY IN ST. CROIX

By James Thorp[2]

The area of about 82 square miles included in this, the first, reconnaissance survey of the soils of the Virgin Islands, is less than one-fourth that mapped in the average soil survey of counties within the continental United States; yet, this relatively small area was found to include an unusual variety of rich soils and to have agricultural possibilities that should prove to be of service in bringing about a more profitable agriculture.

Productive black lands closely resembling the black waxy lands of Texas, broad flat areas with outwashes of volcanic sediments overlapping chalk, and creamy rich areas in the mountain valleys which overlie volcanic tuff, were among the 21 soil types and several phases of soil differentiated in the survey. A notable feature of soil development in the islands is the accumulation of lime and rich plant food in certain areas in which the rainfall, as in the Great Plains States, has not been sufficient to leach out the natural fertility. So rich are certain of these soils that the same kind of crop has been raised on

[2] Bureau of Chemistry and Soils, U. S. Department of Agriculture.

them for centuries without noticeably depleting their fertility. Other areas of the Virgin Islands contain soils that are almost identical with soils of Porto Rico on which some of the world's heaviest crops of sugarcane are grown. At present, however, facilities for irrigation, such as makes possible the large crops of cane in Porto Rico, are wholly lacking in the Virgin Islands, and there is no visible source of water supply sufficient for irrigation.

The 21 soil types and 5 soil phases of St. Croix were classified under four groups. This grouping should prove to be of practical assistance to those who may work out plans of agricultural rehabilitation for the island. Soils of one group, comprising 8 types and 3 phases, are derived from limestone, of which some are marly and others are hard. These soils are moderately shallow, but on the average are very rich. The second group, comprising 9 types, includes soils derived from alluvial deposits. All but 2 of these have lime accumulations in the subsoils, and all but 3 have a heavy claypan in the upper subsoil. Soils of the third group, comprising 2 types and 2 phases, are derived chiefly from volcanic rocks. They are dark and very fertile where not too shallow and too steep for cultivation, and occupy at least one-half the island. The fourth group of 2 types includes lagoon and beach deposits of low value. Several areas of soil, especially near lagoons and sea margins, are impregnated with soluble salts and with black alkali.

The arable soils of the island are on an average rich and well adapted to a large variety of fruits and vegetables, cotton, and sugarcane in years of sufficient precipitation. The steeper and stonier portions are well adapted to tropical forest trees and to pasture grasses. Most of the unused lands are covered with a dense growth of thorny brush and cactus.

St. Croix has been almost wholly devoted to agriculture since its first settlement by white men. Sugarcane was the only commercial crop of any importance for a long time, and it was used for the manufacture of sugar and rum. The cane juices were extracted by mills operated by wind power, and the raw sugar was extracted from the juice in old-fashioned open pans. Later improved machinery was introduced but it is out of date according to modern standards of efficiency. Whereas the soils are admirably adapted to sugarcane, the relatively dry climate and droughty periods over a number of years have greatly reduced cane yields; and recent reductions in the price paid for sugar have prevented capitalists from investing money in new machinery and from producing cane on a large scale. In consequence, the cane-growing industry is rapidly becoming extinct.

Some years ago, during and immediately following the World War, sea-island cotton was a very profitable crop. The soils of the island are well suited to cotton growing, and the crop makes good yields with much less water than is required by sugarcane.

A great variety of vegetables and tropical fruits have been successfully raised, and could be raised in large quantities if a profitable market could be found for them. Tomatoes, beans, peppers, bananas, sapodillas, avocados, pineapples, and citrus do well in certain places. A number of thrifty-looking date trees were observed to be

growing in various parts of the island. Since these trees are said to produce a fair quality of fruit, different proved varieties might be tested with a view to raising them more extensively. Dates thrive in moist soil and are resistant to moderate concentrations of salts. They would probably flourish in some of the poorly drained areas of the coastal plain where the salt accumulations are not too strongly concentrated.

Alfalfa would probably thrive in many parts of the islands where there are no salt accumulations, and it might prove to be a valuable addition to the forage supply for cattle and horses.

At present perishables can not be shipped in good condition to the distant markets of the United States and Europe, but much land is being devoted to cattle, a large number of which are exported.

RECOMMENDATIONS

In view of the low price paid for sugar, the poor facilities available for sugar production, and the relatively dry climate of St. Croix, the sugar industry there seems likely to be doomed to ultimate extinction unless sufficient water is found for irrigation. New crops and new products should be found to supplant cane in the event that the sugar industry becomes extinct. Nearly all the arable soils of the island will produce good crops of vegetables and fair crops of corn, and many lands are well adapted to a large variety of fruits. The untillable hilly lands will produce excellent pasturage which is sufficient not only for animals to provide milk and meat for local consumption, but also for export trade. It is easily practicable, therefore, for the island to produce nearly everything needed for the table and in addition to produce a surplus in many instances. The mountainous and rocky land will produce excellent mahogany and other tropical woods on such slopes as are sheltered from the trade winds, and, under proper foresting methods, these areas could be made to furnish a steady cash crop in years to come.

The production of dry beans for the Porto Rican market would seem to be highly profitable for immediate returns. Large areas of soils are suited to this crop. If the pink bollworm and other pests can be kept under control, sea-island cotton should constitute a substantial commodity for export trade. Pineapples and citrus fruits have been suggested as possible export crops, but neither crop is likely to be raised in quantities more than ample for local demands. This is especially true of pineapples. This crop prefers strongly acid soils, and soils observed in St. Croix were not more than slightly acid. The citrus outlook is brighter than it was formerly, but for export to the States the fruit would have to compete on the market with fruit from Porto Rico and from Florida. Fresh vegetables might be profitably marketed during the winter months in New York provided transportation facilities could be made available. The few scattered cacao trees on the island seem to thrive in the northwestern mountains and valleys. Cacao might be experimented with in this region with a view to extending the area in the crop. The possibility of raising certain important insecticidal plants on the island is under consideration by the Bureau of Chemistry and Soils.

SUMMARY OF WORK ON THE PINK BOLLWORM

By U. C. Loftin [3]

The growing of sea-island cotton, once an important industry in St. Croix, has been abandoned in recent years chiefly on account of the low price paid for the crop and the damage done to it by the pink bollworm (*Pectinophora gossypiella*). During the year a study was made of the pink-bollworm situation to determine the possibility of eradicating the pest as an aid in reestablishing the cotton industry. Notwithstanding the fact that commercial plantings have not been made for several years, the pink bollworm was found in considerable numbers on wild cotton and other host plants. A survey, made to learn the distribution and prevalence of wild cotton, showed it to be widely scattered over the entire area, only

FIGURE 8.—Wild cotton growing along the roadside, St. Croix

few estates on the island being free from it. (Fig. 8.) The cotton plants were found growing most abundantly around the laborers' quarters in the estate villages and along the gullies in inaccessible places in bush lands. The plants were also found growing in the most unexpected places high in the mountains.

The pink bollworm is as widely distributed as the cotton and was always found where there were sufficient cotton bolls for thorough examination. The pink bollworm was rather commonly noticed in okra, and a slight infestation was found in otaheite (*Thespesia populnea*) and in *Hibiscus vitifolius*. Okra is the favorite vegetable of the natives and is grown in every garden; *T. populnea* grows very abundantly along the seashore on the northern and western coasts and is frequently seen in dooryards; and *H. vitifolius* is a common weed along roadsides and in pastures.

[3] Bureau of Entomology, U. S. Department of Agriculture.

Because of the wide distribution of the wild host plants and the danger of reintroduction of the pest from other islands, it was decided not to try to eradicate the pink bollworm in St. Croix, but to clean up the wild cotton—the most important host plant—and adopt a 2-year or a 3-year closed season before planting cotton again. It is hoped that these measures will reduce the pink bollworm population so that cotton may again be produced with a minimum loss.

An amendment to the existing cotton law was passed by the colonial council requiring the landowners to destroy all wild cotton in such manner and at such times as the Cotton Pest Commission should require, and in case of their failure to comply with the law the com-

FIGURE 9.—Cotton plant removed with roots. Note size

mission was authorized to make the clean-up and charge the costs to the owner of the premises. August 15, 1931, was set as the day for the completion of the clean-up. (Fig. 9.) The island was thoroughly scouted, and the sections of wild cotton were mapped by a representative of the station. At the expiration of the time limit a clean-up gang was put to work under the supervision of J. P. Nielson, a farmer, to grub out and burn any cotton remaining. Cleaning up is a slow, tedious task on account of the nature of the country and the almost impenetrable thick bush, but about half the island was cleared by September 1. The clean-up campaign will be continued until the wild cotton is exterminated.

Conditions of pink-bollworm infestation and wild cotton growing in abundance were also found on St. Thomas and St. John, but on account of the small amount of cultivated land there and the close proximity of these islands to the British islands, pink-bollworm control measures were not undertaken.

METEOROLOGICAL OBSERVATIONS

By A. Bisserup

Rainfall at the experiment station for the fiscal year ended June 30, 1931, measured 43.09 inches. The rainfall of January was less than that during the same month of the previous year and was followed by dry weather until about May 15. The absolute maximum temperature for the year was 92° F., recorded August 23 and August 25 and again October 6 and October 21, 1930, and the absolute minimum temperature, 60°, was recorded February 23, 1931. Table 3 gives a summary of the meteorological data for the year.

TABLE 3.—*Condensed meteorological data for the experiment station in St. Croix for the year ended June 30, 1931*

Year and month	Temperature		Total rainfall	Average daily velocity of wind	Monthly evaporation
	Maximum	Minimum			
1930	° F.	° F.	*Inches*	*Miles*	*Inches*
July	89.0	74.2	1.38	53.1	6.493
August	89.9	74.7	1.70	43.5	[1]
September	89.3	74.0	2.94	40.0	[1]
October	89.3	72.7	2.05	27.6	6.147
November	86.4	70.3	10.86	35.0	4.906
December	82.3	69.9	4.77	39.9	4.136
1931					
January	83.3	67.0	2.00	31.0	4.645
February	83.8	67.3	.92	32.4	5.203
March	86.0	68.9	1.38	38.0	6.495
April	86.8	70.4	1.74	48.4	7.460
May	87.9	72.4	5.47	37.7	5.131
June	88.4	60.8	7.88	35.6	5.167
Total			43.09		[2] 58.76

[1] The evaporation tank leaked and the record for August and September therefore is not complete.
[2] Total for 10 months.